Abstract Submitted
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Diocotron Modes in Nonneutral Disc Plasmas.[1] J.C. QUINN, D.H.E. DUBIN, UCSD — We study the $\mathbf{E} \times \mathbf{B}$ dynamics of a thin disc of charge confined in a cylindrical Penning trap with wall radius R_w. The axial extent (thickness) of the disc is assumed to be negligible. We show that, as in other similar cases, monotonic density profiles are stable to small perturbations. We then consider the specific density profile that is a uniformly charged spheroid of radius R projected onto a plane, because for $R \ll R_w$ it has the special property of rotating without shear. An eigenvalue equation for a density perturbation can be obtained by linearizing the equations of motion and using a Green's function. We find an analytic expression for a special class of eigenmodes, which are the diocotron modes, and the corresponding eigenfrequencies. These expressions are compared to the results of a numerical computation which was done by discretizing the eigenvalue equation. These results are also compared to the 2d limit of the Dubin theory of electrostatic modes in a spheroidal plasma.[2]

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[2]D.H.E. Dubin, Phys. Rev. Lett. **66**, 2076 (1991).

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